RECEIVED
CENTRAL FAX CENTER
JAN 2 6 2007

## IN THE CLAIMS

The text of all pending claims, along with their current status, is set forth below in accordance with 37 C.F.R. § 1.121.

1. (Currently amended) A computer system comprising:

a processor;

memory coupled to the processor; and

an object-oriented software product stored in the memory, the software product configured to ~~containing~~:

provide an object-oriented extensible class hierarchy ~~for the storage of transport phenomena simulation data~~, the class hierarchy comprising a first set of generic classes representing a plurality of generic facility ~~object~~ types and a second set of generic classes representing generic named attribute types ~~member variables~~ for the generic facility ~~object~~ types;

provide a file that defines model facility types based on the first set of generic classes and that defines model named attribute types based on the second set of generic classes, wherein the ~~extensible class hierarchy permitting~~ file permits the addition of additional model facility ~~object~~ types and additional model named attribute types ~~member variables~~ without any modifications to the class hierarchy ~~itself~~; and

create facility instances from model facility types and named attribute instances from model named attribute types, wherein facility instances and named attribute instances are stored in memory and coupled in a facility network to simulate transport phenomenon.

2. (Currently amended) The computer system of claim 1 wherein the transport ~~phenomena~~ phenomenon comprises one or more of momentum, energy, and mass transport within a subsurface hydrocarbon-bearing reservoir and between the subsurface hydrocarbon-bearing reservoir and one or more delivery locations at the earth's surface.

3. (Currently amended) The computer system of claim 2 wherein the transport between a subsurface hydrocarbon-bearing reservoir and one or more of the delivery locations

comprises one or more transport pathways, wherein the facility instances represent ~~the transport pathways comprising~~ at least one of production and injection wells ~~well types~~ and one or more other facilities ~~facility types that are linked together to form a facility network~~ through which hydrocarbon fluids are transported between the subsurface reservoir and the delivery locations.

4. (Currently amended) The computer system of claim 3 wherein the other facilities ~~facility types~~ contained within the transport pathways comprise at least one facility selected from surface flowlines, manifolds, separators, valves, pumps, and compressors.

5. (Cancelled)

6. (Currently amended) The computer system of claim 1 wherein the object-oriented software product comprises a graphical user interface whereby a user of the computer system defines the facility network ~~a simulation model containing the specific network of wells and facility objects to simulate transport phenomena into and out of a specific hydrocarbon bearing reservoir~~.

7. (Currently amended) The computer system of claim 1 comprising a graphical user interface configured to ~~enable a user of the computer system to~~ define the additional model named attribute types ~~member variables~~ that extend the functionality of the computer system in a user-customizable manner.

8. (Original) The object-oriented software product of claim 1 wherein the object-oriented software is written in C++.

9. (Previously presented) The computer system of claim 1 further comprising an object-oriented database.

10. (Currently amended) A computer-implemented method of simulating transport phenomena in a facility network that models facilities used in the production of hydrocarbons, the method comprising the steps of:

building a model comprising a facility network, wherein the facility network comprises facility instances formed from model facility types based on a first set of

generic classes and named attribute ~~member variable~~ instances formed from model named attribute types ~~member variables for the facility types~~ based on a second set of generic classes, and wherein a data definitions file defines the model facility types and the model named attribute types and the first set and second set of generic classes are part of a class hierarchy that is not modified by the addition of other model facility types and other model named attribute types to the data definitions file ~~member variables~~;

specifying values of the named attribute instances that are associated with one of ~~member variables and~~ the facility instances ~~types for the facility network~~, wherein ~~the specified values of the facility types form facility instances,~~ the specified values of the named attribute instances associated with the one of the facility instances model properties of the one of the facilities used in the production of hydrocarbons from a reservoir ~~member variables form member variable instances~~;

using the facility instances and named attribute ~~member variable~~ instances in a mathematical simulation of transport phenomena within the facility network as a function of time, wherein the facility instances and named attribute instances are organized to represent facilities used in the production of hydrocarbons from a reservoir; and

predicting the behavior of the facilities based on the mathematical simulation.

11. (Previously presented) The method of claim 10 wherein the facility network is part of a larger simulation model, with the facility network configured to exchange fluids with at least one other part of the simulation model.

12. (Previously presented) The method of claim 11 wherein the simulation model comprises the facility network and a hydrocarbon-bearing formation.

13. (Currently amended) A computer-implemented method of simulating transport phenomena in a model of a physical system comprising a hydrocarbon-bearing reservoir penetrated by a plurality of wells, the plurality of wells connected to surface facilities, the method comprising:

discretizing the model of the physical system into a plurality of volumetric cells, wherein each volumetric cell is modeled as a node, and adjacent nodes exchange fluid through connections between the nodes;

using facility instances created from model facility types and named attribute ~~member variable~~ instances created from model named attribute types ~~of a class hierarchy~~ to model the nodes and connections in the portion of the discretized model that represents wells and surface facilities of the physical system, wherein ~~the class hierarchy comprises a first set of generic classes representing facility types utilized to create the facility instances and a second set of generic classes representing the member variables for the facility types utilized to create the member variable instances;~~ a data definitions file defines model facility types based on a first set of generic classes and model named attribute types based on a second set of generic classes with the first set of generic classes and the second set of generic classes arranged in a ~~the~~ class hierarchy that permits ~~permitting~~ the addition of additional model facility types and additional model named attribute types ~~member variables~~ without any modifications to the class hierarchy ~~itself~~;

specifying geometric and transport properties for each node and connection;

specifying initial conditions for each node and connection;

simulating as a function of time the transport phenomena in the discretized physical system; and

predicting the behavior of the physical system based on the simulation.

14 - 15. (Cancelled)

16. (Currently amended) A computer implemented method of modeling a hydrocarbon system comprising:

accessing an application on a computer system having a first set of generic classes and a second set of generic classes associated in a class hierarchy;

providing model facility types ~~for a hydrocarbon facility network~~ created from the first set of generic classes;

providing model named attribute types ~~member variables~~ that are associated with at least one of the model facility types and created from the second set of generic classes,

providing a data definitions file to define model facility types and model named attribute types, wherein the addition of the additional model facility types and the additional model named attribute types ~~the facility types and the member variables~~ do not modify the class hierarchy of the first set of generic classes and the second set of generic classes;

simulating transport phenomena in a ~~the~~ hydrocarbon facility network with facility instances created from the model facility types and the named attributes ~~member variables~~ instances created from the model named attribute types ~~member variables~~, wherein the hydrocarbon facility network represents facilities in the hydrocarbon system; and

evaluating the results of the simulation to manage operation of the hydrocarbon system.

17. (Previously presented) The method of claim 16 wherein the simulation models fluid transport between a surface facility and a subsurface formation accessed by a well.

18. (Currently amended) The method of claim 16 wherein the model facility types comprise model representations of one or more types of surface flowlines, manifolds, separators, valves, pumps, compressors.

19. (Previously presented) The method of claim 16 wherein the simulation models fluid transport between surface facilities and a subsurface formation accessed by a plurality of wells.

20. (Currently amended) The method of claim 16 comprising coding the first set of generic classes representing the generic facility types and the second set of generic classes representing generic named attribute types ~~member variables~~ prior to loading the application onto the computer system.

21. (Cancelled)

22. (Currently amended) The method of claim 16 comprising:

creating facility instances from the model facility types by a simulator user; and

utilizing the facility instances to represent components of the hydrocarbon facility network for the simulation.

23. (Previously presented) The method of claim 16 further comprising managing the hydrocarbon system based on the evaluation.

24. (Currently amended) A reservoir modeling system comprising a computer-readable medium encoded with instructions, the instructions configured to:

provide a first set of generic classes and a second set of generic classes associated in a class hierarchy;

define model facility types and model named attribute types in a file, wherein additional model facility types and additional model named attribute types do not modify the class hierarchy of the first set of generic classes and the second set of generic classes;

access model facility types ~~created from~~ based on the first set of generic classes;

access model named attribute types ~~member variables created from~~ based on the second set of generic classes that are associated with at least one of the model facility types~~, wherein the facility types and the member variables do not modify the class hierarchy of the first set of generic classes and the second set of generic classes~~;

create a hydrocarbon facility network with facility instances created from the model facility types and ~~the~~ named attribute ~~member variables~~ instances created from the model named attribute types ~~member variables~~;

simulate fluid flow in the hydrocarbon facility network; and

display the simulation results for evaluation of the hydrocarbon facility network.

25. (Currently amended) The reservoir modeling system of claim 24 wherein the model facility types comprise representations of one or more types of surface flowlines, manifolds, separators, valves, pumps, compressors.

26. (Previously presented) The reservoir modeling system of claim 24 wherein the facility instances represent physical equipment in the flow path between a reservoir and a delivery location.

27. (Currently amended) The reservoir modeling system of claim 24 further comprising instructions configured to construct logic that dynamically controls the behavior of facility instances ~~facilities~~ in the hydrocarbon facility network during a simulation run.

28. (Cancelled)